

U.S. Patent Application
Serial No. 10/593,791

ATTACHMENT A

Claims 1 - 70: (Cancelled)

71. (New) A propylene copolymer composition comprising:

- A) from 50% to 80% by weight of a propylene copolymer comprising from 0.05 to 0.99% by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene; and
- B) from 20% to 50% by weight of one propylene copolymer comprising from about 7.01 to about 20.0 % by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene;

said propylene copolymer composition further comprising:

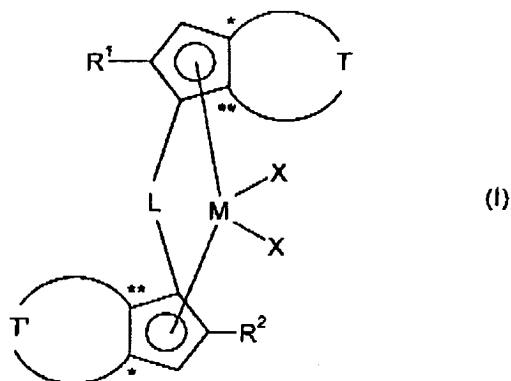
- (i) a MFR (230°C/2.16 kg) from about 1 to about 20 g/10 min;
- (ii) a tensile E modulus according to ISO 527-2:1993 from about 400 to about 800 MPa; and
- (iii) a molar mass distribution M_w/M_n ranging from 1.5 to 3.5.

72. (New) The propylene copolymer composition as claimed in claim 71, further comprising a melting point from 143°C to 150°C.

73. (New) The propylene copolymer composition as claimed in claim 71, further comprising a haze according to ASTM D 1003 from 25% to 40% without adding clarifying agents.

U.S. Patent Application
Serial No. 10/593,791

74. (New) The propylene copolymer composition as claimed in claim 71, produced using a catalyst system comprising at least one metallocene compound of formula (I),



wherein

- M is zirconium, hafnium or titanium;
- X are, identical or different and are independently of one another, hydrogen, halogen, -R, -OR, -OSO₂CF₃, -OCOR, -SR, -NR₂ or -PR₂, wherein R is a linear or branched C₁-C₂₀-alkyl or C₃-C₂₀-cycloalkyl, wherein the C₁-C₂₀ alkyl or C₃-C₂₀ cycloalkyl may be substituted by at least one C₁-C₁₀-alkyl radical, or R is a C₆-C₂₀-aryl, C₇-C₂₀-alkylaryl or C₇-C₂₀-arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, or R may comprise at least one unsaturated bond, or two X radicals may be joined to one another;
- L is a divalent bridging group selected from the group consisting of a C₁-C₂₀-alkylidene radical, a C₃-C₂₀-cycloalkylidene radical, a C₆-C₂₀-arylidene radical, a C₇-C₂₀-alkylarylidene radical and a C₇-

U.S. Patent Application
Serial No. 10/593,791

C₂₀-arylalkylidene radical, which may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, or a silylidene group comprising up to 5 silicon atoms;

R¹ is a linear or branched C₁-C₂₀-alkyl or C₃-C₂₀-cycloalkyl, wherein the C₁-C₂₀ alkyl or C₃-C₂₀ cycloalkyl may be substituted by at least one C₁-C₁₀-alkyl radical, or R is a C₆-C₂₀-aryl, C₇-C₂₀-alkylaryl or C₇-C₂₀-arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, and R may comprise at least one unsaturated bond;

R² is -C(R³)₂R⁴;

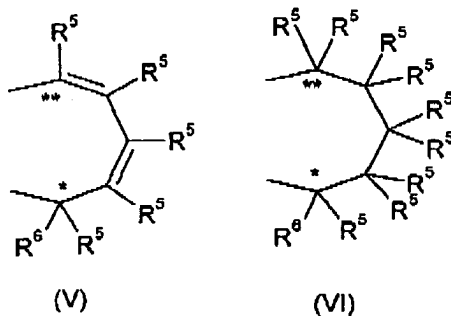
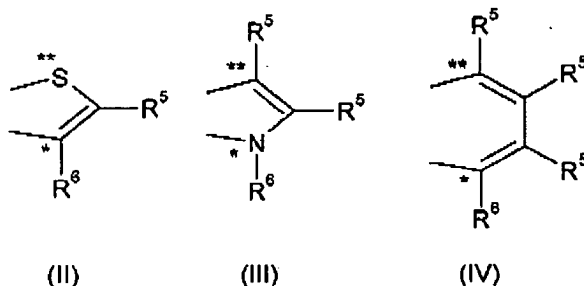
R³ are, identical or different and are each independently of one another, a linear or branched C₁-C₂₀-alkyl or C₃-C₂₀-cycloalkyl, wherein the C₁-C₂₀ alkyl or C₃-C₂₀ cycloalkyl may be substituted by at least one C₁-C₁₀-alkyl radical, or R is a C₆-C₂₀-aryl, C₇-C₂₀-alkylaryl or C₇-C₂₀-arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, and R may comprise at least one unsaturated bond, or two R³ radicals may be joined to form a saturated or unsaturated C₃-C₂₀-ring;

R⁴ is hydrogen or a linear or branched C₁-C₂₀-alkyl or C₃-C₂₀-cycloalkyl, wherein the C₁-C₂₀ alkyl or C₃-C₂₀ cycloalkyl may be substituted by at least one C₁-C₁₀-alkyl radical, or R is a C₆-C₂₀-aryl, C₇-C₂₀-alkylaryl or C₇-C₂₀-arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17

U.S. Patent Application
Serial No. 10/593,791

of the Periodic Table of Elements, and R may comprise at least one unsaturated bond;

T and T' are divalent groups of formula (II), (III), (IV), (V) or (VI),



wherein

the atoms denoted by the symbols * and ** are joined to the atoms of the metallocene compound of formula (I) which are denoted by the same symbol, and

R⁵ are, identical or different and are each independently of one another, hydrogen, halogen or a linear or branched C₁-C₂₀-alkyl or C₃-C₂₀-cycloalkyl, wherein the C₁-C₂₀ alkyl or C₃-C₂₀ cycloalkyl may be substituted by at least one C₁-C₁₀-alkyl radical, or R is a C₆-C₂₀-aryl, C₇-C₂₀-alkylaryl or C₇-C₂₀-arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17

U.S. Patent Application
Serial No. 10/593,791

of the Periodic Table of Elements, or R may comprise at least one unsaturated bond;
R⁶ are, identical or different and are each independently of one another, halogen or a linear or branched C₁-C₂₀-alkyl or C₃-C₂₀-cycloalkyl, wherein the C₁-C₂₀ alkyl or C₃-C₂₀ cycloalkyl may be substituted by at least one C₁-C₁₀-alkyl radical, or R is a C₆-C₂₀-aryl, C₇-C₂₀-alkylaryl or C₇-C₂₀-arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, or R may comprise at least one unsaturated bond.

75. (New) The propylene copolymer composition as claimed in claim 74, wherein L is -SiMe₂- or -SiPh₂-.

76. (New) The propylene copolymer composition as claimed in claim 74, wherein R¹ is preferably a linear or branched C₁-C₁₀-alkyl group which is unbranched in the α position.

77. (New) The propylene copolymer composition as claimed in claim 76, wherein R¹ is a linear C₁-C₄-alkyl group.

78. (New) The propylene copolymer composition as claimed in claim 77, wherein R¹ is methyl, ethyl, n-propyl or n-butyl.

79. (New) The propylene copolymer composition as claimed in claim 71, wherein the alpha olefin is exclusively ethylene.

U.S. Patent Application
Serial No. 10/593,791

80. (New) The propylene copolymer composition as claimed in claim 71, wherein the alpha olefin of B) is from about 7.01% to about 9.99% by weight.

81. (New) The propylene copolymer composition as claimed in claim 71, wherein the alpha olefin of B) is from about 8.0% to about 9.6% by weight.

82. (New) The propylene polymer composition as claimed in claim 71, wherein the MFR is from 6 to 12 g/10min.

83. (New) The propylene polymer composition as claimed in claim 71, wherein the tensile E modulus is from 550 to 750 MPa

84. (New) A process for producing at least one fiber, film or molding comprising:

A) from 50% to 80% by weight of a propylene copolymer comprising from 0.05 to 0.99% by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene; and

B) from 20% to 50% by weight of one propylene copolymer comprising from about 7.01 to about 20.0 % by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene;

said propylene copolymer composition further comprising:

(i) a MFR (230°C/2.16 kg) from about 1 to about 20 g/10 min;

U.S. Patent Application
Serial No. 10/593,791

(ii) a tensile E modulus according to ISO 527-2:1993 from about 400 to about 800 MPa; and

(iii) a molar mass distribution M_w/M_n ranging from 1.5 to 3.5;

wherein the process comprises extruding or injection-molding the fiber, film, or molding.

85. (New) A film comprising a propylene copolymer composition comprising:

A) from 50% to 80% by weight of a propylene copolymer comprising from 0.05 to 0.99% by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene; and

B) from 20% to 50% by weight of one propylene copolymer comprising from about 7.01 to about 20.0 % by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene;

wherein A) and B) are obtained using a catalyst system comprising at least one metallocene compound, and the propylene copolymer composition further comprises a MFR from about 1 to about 20, a tensile E modulus from about 400 to about 800 MPa, and a molar mass distribution M_w/M_n ranging from 1.5 to 3.5; and the film has a haze less than about 10.0% and a dart impact greater than about 150 gms for a 1 mil thick film.

86. (New) The film according to claim 85 further comprising a melting point of between about 143°C to about 150°C.

U.S. Patent Application
Serial No. 10/593,791

87. (New) The film according to claim 85, wherein the film has a haze less than about 5% for a 1 mil thick film.

88. (New) The film according to claim 85, wherein the film has a dart impact greater than about 200 gm for a 1 mil thick film.

89. (New) The film according to claim 85, wherein the tensile E modulus of the propylene copolymer composition is from about 550 to about 750 MPa.

90. (New) The film according to claim 85, wherein the film further comprises a WVTR greater than about 11.6 gm/m²-day.

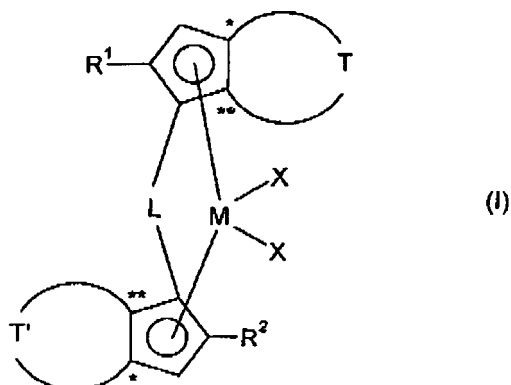
91. (New) The film according to claim 85, wherein the film further comprises a OTR greater than about 3875 gm/m²-day.

92. (New) The film according to claim 85, wherein the film further comprises a CO₂TR greater than about 19,375 cc/m²-day.

93. (New) The film according to claim 85, wherein the film further comprises a hexane extractables not greater than about 2.6%, and xylene solubles less than about 30%.

94. (New) The film according to claim 85, wherein the metallocene compound is of formula (I):

U.S. Patent Application
Serial No. 10/593,791



wherein

M is zirconium, hafnium or titanium;

X are, identical or different and are independently of one another, hydrogen, halogen, -R, -OR, -OSO₂CF₃, -OCOR, -SR, -NR₂ or -PR₂, wherein R is a linear or branched C₁-C₂₀-alkyl or C₃-C₂₀-cycloalkyl, wherein the C₁-C₂₀ alkyl or C₃-C₂₀ cycloalkyl may be substituted by at least one C₁-C₁₀-alkyl radical, or R is a C₆-C₂₀-aryl, C₇-C₂₀-alkylaryl or C₇-C₂₀-arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, or R may comprise at least one unsaturated bond, or two X radicals may be joined to one another;

L is a divalent bridging group selected from the group consisting of a C₁-C₂₀-alkylidene radical, a C₃-C₂₀-cycloalkylidene radical, a C₆-C₂₀-arylidene radical, a C₇-C₂₀-alkylarylidene radical and a C₇-C₂₀-arylalkylidene radical, which may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, or a silylidene group comprising up to 5 silicon atoms;

U.S. Patent Application
Serial No. 10/593,791

R^1 is a linear or branched C_1 - C_{20} -alkyl or C_3 - C_{20} -cycloalkyl, wherein the C_1 - C_{20} alkyl or C_3 - C_{20} cycloalkyl may be substituted by at least one C_1 - C_{10} -alkyl radical, or R is a C_6 - C_{20} -aryl, C_7 - C_{20} -alkylaryl or C_7 - C_{20} -arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, and R may comprise at least one unsaturated bond;

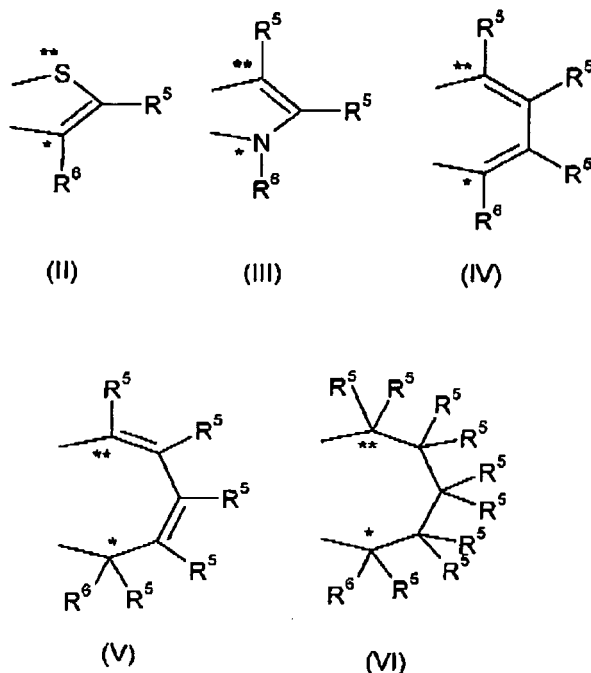
R^2 is $-C(R^3)_2R^4$;

R^3 are, identical or different and are each independently of one another, a linear or branched C_1 - C_{20} -alkyl or C_3 - C_{20} -cycloalkyl, wherein the C_1 - C_{20} alkyl or C_3 - C_{20} cycloalkyl may be substituted by at least one C_1 - C_{10} -alkyl radical, or R is a C_6 - C_{20} -aryl, C_7 - C_{20} -alkylaryl or C_7 - C_{20} -arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, and R may comprise at least one unsaturated bond, or two R^3 radicals may be joined to form a saturated or unsaturated C_3 - C_{20} -ring;

R^4 is hydrogen or a linear or branched C_1 - C_{20} -alkyl or C_3 - C_{20} -cycloalkyl, wherein the C_1 - C_{20} alkyl or C_3 - C_{20} cycloalkyl may be substituted by at least one C_1 - C_{10} -alkyl radical, or R is a C_6 - C_{20} -aryl, C_7 - C_{20} -alkylaryl or C_7 - C_{20} -arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, and R may comprise at least one unsaturated bond;

T and T' are divalent groups of formula (II), (III), (IV), (V) or (VI),

U.S. Patent Application
Serial No. 10/593,791



wherein

the atoms denoted by the symbols * and ** are joined to the atoms of the metallocene compound of formula (I) which are denoted by the same symbol, and

R^5 are, identical or different and are each independently of one another, hydrogen, halogen or a linear or branched C_1 - C_{20} -alkyl or C_3 - C_{20} -cycloalkyl, wherein the C_1 - C_{20} alkyl or C_3 - C_{20} cycloalkyl may be substituted by at least one C_1 - C_{10} -alkyl radical, or R is a C_6 - C_{20} -aryl, C_7 - C_{20} -alkylaryl or C_7 - C_{20} -arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, or R may comprise at least one unsaturated bond;

R^6 are, identical or different and are each independently of one another, halogen or a linear

U.S. Patent Application
Serial No. 10/593,791

or branched C_1 - C_{20} -alkyl or C_3 - C_{20} -cycloalkyl, wherein the C_1 - C_{20} alkyl or C_3 - C_{20} cycloalkyl may be substituted by at least one C_1 - C_{10} -alkyl radical, or R is a C_6 - C_{20} -aryl, C_7 - C_{20} -alkylaryl or C_7 - C_{20} -arylalkyl, wherein R may comprise at least one heteroatom of groups 13-17 of the Periodic Table of Elements, or R may comprise at least one unsaturated bond.

95. (New) The propylene copolymer composition as claimed in claim 94, wherein L is $-\text{SiMe}_2-$ or $-\text{SiPh}_2-$.

96. (New) The propylene copolymer composition as claimed in claim 94, wherein R^1 is preferably a linear or branched C_1 - C_{10} -alkyl group which is unbranched in the α position.

97. (New) The propylene copolymer composition as claimed in claim 96, wherein R^1 is a linear C_1 - C_4 -alkyl group.

98. (New) The propylene copolymer composition as claimed in claim 97, wherein R^1 is methyl, ethyl, n-propyl or n-butyl.

99. (New) The film according to claim 85, wherein the MFR is from about 6 to about 12.

100. (New) An article comprising at least one layer of a film comprising a propylene copolymer composition comprising:

- A) from 50% to 80% by weight of a propylene copolymer comprising from 0.05 to 0.99% by weight of at least one alpha olefin comprising from 2 to

U.S. Patent Application
Serial No. 10/593,791

10 carbon atoms, with the proviso that the alpha olefin is not propylene; and

- B) from 20% to 50% by weight of one propylene copolymer comprising from about 7.01 to about 20.0 % by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene;

wherein A) and B) are obtained using a catalyst system comprising at least one metallocene compound, and the propylene copolymer composition further comprises a MFR from about 1 to about 20, a tensile E modulus from about 400 to about 800 MPa, and a molar mass distribution M_w/M_n ranging from 1.5 to 3.5; and

the film has a haze less than about 10.0% and a dart impact greater than about 150 gms for a 1 mil thick film.

101. (New) A laminate comprising at least one layer of a polyolefin film and at least one layer of a film comprising a propylene copolymer composition comprising:

- A) from 50% to 80% by weight of a propylene copolymer comprising from 0.05 to 0.99% by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene; and
- B) from 20% to 50% by weight of one propylene copolymer comprising from about 7.01 to about 20.0 % by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene;

U.S. Patent Application
Serial No. 10/593,791

wherein A) and B) are obtained using a catalyst system comprising at least one metallocene compound, and the propylene copolymer composition further comprises a MFR from about 1 to about 20, a tensile E modulus from about 400 to about 800 MPa, and a molar mass distribution M_w/M_n ranging from 1.5 to 3.5; and the film has a haze less than about 10.0% and a dart impact greater than about 150 gms for a 1 mil thick film.

102. (New) A coated article comprising a substrate and a film comprising a propylene copolymer composition comprising:

- A) from 50% to 80% by weight of a propylene copolymer comprising from 0.05 to 0.99% by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene; and
- B) from 20% to 50% by weight of one propylene copolymer comprising from about 7.01 to about 20.0 % by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene;

wherein A) and B) are obtained using a catalyst system comprising at least one metallocene compound, and the propylene copolymer composition further comprises a MFR from about 1 to about 20, a tensile E modulus from about 400 to about 800 MPa, and a molar mass distribution M_w/M_n ranging from 1.5 to 3.5; and

the film has a haze less than about 10.0% and a dart impact greater than about 150 gms for a 1 mil

U.S. Patent Application
Serial No. 10/593,791

thick film, wherein the film has been coated onto the substrate.

103. (New) A co-extruded, multilayer film comprising at least one layer of a film comprising a propylene copolymer composition comprising:

- A) from 50% to 80% by weight of a propylene copolymer comprising from 0.05 to 0.99% by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene; and
- B) from 20% to 50% by weight of one propylene copolymer comprising from about 7.01 to about 20.0 % by weight of at least one alpha olefin comprising from 2 to 10 carbon atoms, with the proviso that the alpha olefin is not propylene;

wherein A) and B) are obtained using a catalyst system comprising at least one metallocene compound, and the propylene copolymer composition further comprises a MFR from about 1 to about 20, a tensile E modulus from about 400 to about 800 MPa, and a molar mass distribution M_w/M_n ranging from 1.5 to 3.5; and the film has a haze less than about 10.0% and a dart impact greater than about 150 gms for a 1 mil thick film.

104. (New) The process of claim 84, wherein the molding is a large hollow body.

U.S. Patent Application
Serial No. 10/593,791

105. (New) The propylene copolymer composition of claim 71, wherein the propylene copolymer A) ranges from 60 to 75% by weight.

106. (New) The propylene copolymer composition of claim 71, wherein the propylene copolymer A) ranges from 65 to 72% by weight.

107. (New) The propylene copolymer composition of claim 71, wherein the propylene copolymer B) ranges from 25 to 40% by weight.

108. (New) The propylene copolymer composition of claim 71, wherein the propylene copolymer B) ranges from 28 to 35% by weight.

109. (New) The propylene copolymer composition of claim 71, wherein the tensile E modulus ranges from about 600 MPa to about 700 MPa.

110. (New) The propylene copolymer composition of claim 71, wherein the molar mass distribution M_w/M_n ranges from 2 to 2.5.

111. (New) The propylene copolymer composition of claim 71, wherein the molar mass distribution M_w/M_n ranges from 2 to 2.4.